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ELEMENTARY MYCOLOGY.

W. A. KELLERMAN.

Continued.

It is quickly perceived that plants, so varied and diverse, possess in many cases evident affinity, *i. e.*, relationship with each other. A dozen Willows may be encountered and never would even a child call one of them an Oak, a Fern or a Toadstool. Seldom would a species of Oak, Fern or Toadstool be called by another name. The Roses are really all Roses to the tyro first noticing plants. Close inspection never fails to confirm this first impression. The wood, bark, buds, leaf-venation, flowers and catkins singly show, combined much more positively, the real relationship existing between these kinds, or *species* as they are called. The Rose Family — not exclusively the generally recognized genus of Roses — possesses usually five petals and many stamens, all inserted on the calyx tube — a badge of consanguinity that no other plants possess. The kinds of fruits, leaf-pat-terns, and many other structures of Rosaceous plants lead one as surely to a grouping of the hosts of these plants into the classes larger or smaller in which by nature they belong. A study of a Flora is largely a search for affinity in the numbers composing it. Looking out upon a landscape or sweeping the eye over prairie or grove yields no specific knowledge of the components that determine the impressions first experienced. An inspection of the individuals is the beginning point of our real knowledge of plants. The likeness of two or more — that is, possession of identical structures (or *characters* as we call them), suggests the idea of relationship between them — an impression that is greatly strengthened by wider experience; till finally the human mind can not resist the conclusion that the entire vegetable kingdom is embraced in this bond of unity. It scarcely need be added that other than mere superficial characters must be investigated — the internal structures, and the physiological phenomena (for these are usually associated with types of organs or anatomical peculiarities) need to be interpreted as well. In short the plant in its entirety, “all in all,” must be subjected to the most critical study, and varied and crucial tests. It may be more than the recognizable mass of tissues or anatomical parts; it certainly is composed of matter of apparently various forms or kinds in which inheres remarkable physical energy — or as we say, in our ignorance of their full import, “vital forces.”

SPECIES AND LESSER GROUPS.—Observation of the pronounced similarity or essential likeness of individuals enables us to speak at once of a “*kind*” — and this is precisely the idea expressed by the common word “*species*.” No technical definition now need

if it could be given of "species" in the organic kingdom. Exact or essential similarity in all the characters manifest in the embryonic development through to maturity and ultimate death, is the leading idea contained in the word species. The individuals are almost invariably so closely similar that a more or less detailed description of any one would apply to all. Moreover, the likeness is so marked that the individuals may be unhesitatingly referred to a common and not very remote parentage. Again, under conditions which are understood — at least recognized — an individual, or set of individuals, may depart to a minor degree from the type as fixed in mind from an examination of many specimens of a kind or species. We would expect in this case that the descendants would show the same characters; to designate such a group the word *sub-species* is to be used. It should be said that at least occasional individuals would be found that connect by perceptible or indeed imperceptible gradations the sub-species with the type or normal species. Perhaps these are the incipient stages of a new species. Moreover, there are "*sports*" which are to be distinguished from real sub-species. In such case we would find a single individual with some remarkable variant structure — say a violet without a spur, a radiate-symmetrical flower when the normal form is irregular in shape, a Mushroom with lop-sided cap, a *Collybia radicata* without a "root," etc.; and in no instance of the "sport" do we expect the peculiar form to be repeated in the descendants. It may be added, however, that it is feasible "artificially" to multiply the sport and so produce many "individuals." This is done often by horticulturists and florists to obtain their so-called "new varieties," by excising portions of the "sport" and placing these "cuttings" in favorable conditions for continued growth. In this manner many of our ornamental plants and common kinds of cultivated fruit trees "originated"; they are multiplied on an enormous scale for commercial purpose by "grafting" and "budding." Any form of "vegetative" reproduction (as opposed to "seed-reproduction") of the "sport" would likewise continue its existence. In one sense therefore we may, for example, regard the countless millions of Ben Davis apple trees, the Alberta Peach, the Kiefer Pear, etc., as pieces of the one original plant or "sport" from which the first cutting was made. One other group-term is occasionally used by botanists which must here be explained, namely, "*forma*" or anglicised to "form." While this is the common English word it must be remembered that it has here a technical significance. It would be used when the individuals exhibit quite a minor variation; it would scarcely be sufficient to constitute a sub-species. Our knowledge of the Vegetable Kingdom is yet too limited to employ this characterization with much assurance or indeed advantage. And as a matter of fact, for the same reason the other groups, though more patent, are by no means conceived of

in exactly the same sense by different botanists. They are to be regarded as tentative terms—indispensable at present but will undoubtedly be inadequate if not quite incorrect when botanical science is more fully developed.

RACE, STRAIN, CLONE.—Though a brief treatise on Mycology scarcely demands the explanation of any other classificatory terms than those given above, yet it may be well to elucidate three other subordinate groups, namely, "Race," "Strain," and "Clone"—terms which have their chief use in connection with Agriculture and Horticulture and refer to groups in cultivation. By *Races* we indicate those which have not only well marked and differentiating characters but which propagate themselves true to seed, though slight individual variations would of course be expected. *Strains* include groups of cultivated plants that do no differ in appearance or botanical characters from a "Race" but exhibit some distinctive quality—it may be greater hardiness or adaptability, greater yield, etc. It is a vague distinction at best, and however important in practice, apparently of no botanical or scientific value. But the term "*Clone*" (from the Greek *Klon*, twig, spray or slip) indicates those plants that are propagated vegetatively, as by buds, grafts, cuttings, suckers, runners, slips, bulbs, tubers, etc.—all of which imply the handling of higher plants exclusively, but any vegetative method of multiplying a desirable species of Mushroom, for example, would likewise come under this head; these would not come true to seed. They are in fact the "individuals" obtained by "multiplying" a sport, or the single plant from which the first cutting or portion was obtained. The important fact to bear in mind is that the plants grown from such vegetative parts are *not individuals in the ordinary sense*, but are "transplanted" parts of the same individual and "in heredity, and in all biological and physiological senses such plants are the same individual."

GENUS, FAMILY, ORDER, CLASS.—As has been intimated the *species* (composed of individuals that are alike) is the convenient biological unit in the classification of organisms. It is the group first or most readily grasped, and therefore the most satisfactory starting point in a discussion of this subject. Going into the fields or woods the individual plants even on cursory examination would unhesitatingly be referred to the various species to which they evidently and really belong. It would also be perceived at once that some sets of species were much alike and others quite unlike. The several species, for example, of Red Oaks, of Black Oaks, of White Oaks, of Bur Oaks, etc., would be associated in mind, and the Willows, the Hickories, the Mints, the Mushrooms, etc., likewise would be readily grouped according to their natural affinities. The species first referred to would form the genus of Oaks (*Quercus*), and in like manner we would have the genus of Willows (*Salix*), the genus of Hickories (*Hicoria*).

the genus of Mints (*Mentha*), and the genus *Agaricus*. A genus then is a group of species that strongly resemble each other. There are always a few, a greater or lesser number of important or essential characters that are common to all the species of the genus; some one if not several or all of these distinctive points would be absent from every other genus of plants. Proceeding in the same manner with genera — that is, grouping those together which have some evident and important resemblance — we get *Families*; these consist of related genera. Again, Families of plants having evident relationship constitute *Orders*. These may be grouped in larger associations that can be denominated *CLASSES*, and thus the entire Vegetable Kingdom may be synoptically arranged.

NOMENCLATURE.—It has been found convenient and sufficiently definite for ordinary purposes to apply a scientific name to the numerous easily recognized kinds of plants and this consists simply of the *genus* and the *species*; thus the White Oak is called *Quer'-cus al'ba*, the Artichoke *He-li-an'-thus tu-ber-o'-sus*, the Common Mushroom *A-gar'-i-cus cam-pes'-tris*, the Morel *Morchel'-la es-cu-len'-ta*, the Sunflower Rust *Puc-cin'-i-a he-li-an'-thi* etc. The botanical name is therefore binomial, consisting of a generic and a specific name — the genus placed first, followed by the species. In case a sub-species is to be designated a trinomial would be used, as *He-li-an'-thus tu-ber-o'-sus sub-ca-nes'cens*, etc. Authors occasionally indicate a "form," where in their opinion the designation of sub-species would scarcely or not at all be warranted, and in such case the scientific name might be a quadri-nomial, or if a trinomial the name following the species would be used for a "form" (latinized to "*forma*," or abridged to "*for*," or "*f*."). It will be found in Manuals, Monographs, Printed Lists, etc., that the author of the species-name is always indicated; thus *Quercus alba* L., and *Morchella esculenta* Pers., indicate that Linnaeus named the White Oak and that Persoon is the author of the botanical name of the Morelle. It sometimes happens that two different names have been applied to a species. In such case the one *first given* stands and all later names that may have been applied to that species are *synonyms* and to be discarded. In many cases it has happened that the true relationship of the plants was not correctly apprehended and therefore placed in a wrong genus; or it may be that subsequently a valid genus has been proposed by some botanist to receive a certain species or two or three species of one of the existing genera. In such case the name — for example, of the Kentucky Coffee tree — is written thus: *Gym-noc'-la-dus di-oi'-ca* (L.) Koch, and the explanation is this: Linnaeus took this plant to be a member of the genus *Gui-lan-di'-na*, and hence the name in early botanical literature was *Gui-lan-di'-na di-oi'-ca* L. (1753). Later another genus was proposed, *Gym-noc'-la-dus*; and it must be explained that a new spe-

cific name was (of course unwarrantably) coined at the same time for this plant, namely, *can-a-den'-sis*, so that in American Manuals (except recent ones) the name of this tree stands as *Gym-noc'-la-dus can-a-den'-sis* Lam. (1869). But Koch restored the specific name originally applied by Linnaeus, and hence the botanical name of the Kentucky Coffee tree is followed by a double citation of authors and thus stands in print: *Gym-noc'-la-dus di-oi'-ca* (L.) Koch. An example from Mycological literature is as follows: The Corn-Smut is now designated as *Us-ti-la'-go ze'-ae* (Beckm.) Ung., and the history of the nomenclature in this case is as follows. The Smut was called by Beckman *Ly-co-per'-don ze'-ae*, and later Unger perceived its relationship to the forms included in the genus *Ustilago*, hence he is credited with this correct combination. *Ustilago maydis* — so commonly used in botanical publications is a synonym of the name as given correctly above. Still more complicated cases in which the principle of priority is concerned are those where there are two or three (or more) distinct spore-producing stages in the life cycle of the fungus. To illustrate this a common Rust on Wheat may be cited, namely, the species that has been generally called *Puc-cin'-i-a gram'-in-is*. This has its first stage (or first two stages) on Barberry leaves. It was originally named *Ly-co-per'-don poc-u-li-for'-mis* by Jacquin in 1786, but not at all understood, since it has no affinities with the Puffballs (*Lycoperdon*). Then in 1891 Gmelin named the Cluster-cup stage of this Rust, which occurs on Barberry leaves, *Ae-cid'-i-um ber-ber'-i-dis*. The last stage — in which the spores are called *teleutospores* — was named *Puc-cin'-i-a gram'-in-is* by Persoon in 1797. While it has been the common custom to designate this by the latter name, strict application of the principle of priority (which is certainly desirable) requires that the name be written as follows: *Puccinia poculiformis* (Jacq.) Wettst. — the latter author having in 1885 made this correct combination.

OHIO FUNGI. FASCICLE X.

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List of Species, and Hosts.

181. *Coleosporium sonchi* (Pers.) Lév. on *Aster paniculatus* Lam.
182. *Dimerosporium collinsii* (Schw.) Thuem. on *Amelanchier canadensis* (L.) Medic.
183. *Erysiphe polygoni* DC. on *Polygonum erectum* L.
184. *Gloeosporium sanguinariae* E. & E. on *Sanguinaria canadensis* L.
185. *Gymnosporangium nidus-avis* Thax. on *Amelanchier canadensis* (L.) Medic.
186. *Kuehneola albida* (Kuehn) Mag. on *Rubus nigrobaccus* Bailey.